



September 13, 2023

Bay Area Air Quality Management District (BAAQMD)
Engineering Division
375 Beale Street, Suite 600
San Francisco, CA 94105

SUBJECT: Apple Inc. Plant #22839

RE: Application for Permit Modification for BAAQMD Plant #22839

REF: 0664430

Apple Inc. (Apple) currently owns and operates emission sources under BAAQMD Plant #22839, located in Santa Clara, CA. Apple is requesting an authority to construct and permit to operate for a 1,700 gallon solvent waste tank (S-NEW) at the facility. S-NEW is a horizontal aboveground tank receiving waste solvent and water from solvent spray benches and wet benches from S-1 (Semiconductor Fab Research and Development Facility).

With this application, Apple has included the following documentation:

- Appendix A: BAAQMD permit application forms;
- Appendix B: Facility site map and process flow diagram;
- Appendix C: Emission calculations;
- Appendix D: Safety data sheets; and
- Appendix E: Equipment specifications.

We appreciate BAAQMD's ongoing support. If you have any questions regarding the attached application, please call me at (408) 908-0167.

Sincerely,

Tom Huynh
EHS
Apple Inc.

Attachment: Application for Permit Modification for BAAQMD Plant #22839



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Appendix A: BAAQMD Permit Application Forms

**BAY AREA AIR QUALITY MANAGEMENT DISTRICT****Application Cover Form – “P-101B form”**

All fields are required unless otherwise noted. Please type or print.
No information provided on this form can be marked trade secret.

Send to:
BAAQMD
Engineering Division
375 Beale St., Suite 600
San Francisco, CA 94105
Email: permits@baaqmd.gov

Phone: (415) 749-4990

1. Facility and Project Information

- If this facility does not have a current BAAQMD permit or active permit application (new facility), fill out the **Facility Creation and Contacts Form** part of this form.
- If this application is in response to a Notice of Violation from BAAQMD Compliance & Enforcement Division, please enter the NOV number here

Facility Name	Facility ID (except new facilities)
Apple Inc. Facility ID 22839	
Application Title/ Project or Equipment Description	
Solvent Waste Tank	
Equipment/Project Location in relation to facility location (e.g., NW corner of facility OR 338 Washington Dr.) (Optional)	

2. Application Contact

First Name	Last Name		
Kevin	Sung		
Business Name of Contact (If different from facility)		Contact Title	
		EHS Engineer	
Address Line 1		Address Line 2 (Optional)	
One Apple Park Way		MS 991-SB01	
City	State	Zip Code	
Cupertino	CA	95014	
E-mail Address			
kevin_sung@apple.com			
Primary Phone (xxx-xxx-xxxx)	Alternate Phone (Optional)		Fax Number (Optional)
408-908-0167			

3. Proximity to a School (K-12)

Is the equipment/project located within 1,000 ft of the outer boundary of the nearest school? ☐ Yes ☒ No

4. Additional Information: The following additional information is required to complete all permit applications and should be included with your submittal. Failure to provide this information may delay the review of your application.

- ☒ A facility map with street address or location and the property boundary, drawn roughly to scale, that locates the equipment and its emission points, completed data form(s), and a pollutant flow diagram for each piece of equipment. (See www.baaqmd.gov/forms/permits)
- ☒ Equipment/project description, manufacturer's data
- ☒ Discussion and/or calculations of air pollutant emissions from the equipment

5. Small Business Certification (optional): If the facility identified in Part 1 qualifies as a small business as defined in Regulation 3, certify by checking boxes that your business meets all the following criteria. You may qualify for an application fee reduction.

- ☐ The business does not employ more than 10 persons and its gross annual income does not exceed \$750,000.
- ☐ And the business is not an affiliate of a non-small business. (Note: a non-small business employs more than 10 persons and/or its gross income exceeds \$750,000.)

6. Green Business Certification (optional): If the facility identified in Part 1 has been certified as a Green Business by the Association of Bay Area Governments and implemented by participating counties, check the box & include your documentation. You may qualify for an application fee reduction.

☐ Green Business certificate included

An electronic version of this form and instructions can be found at www.baaqmd.gov.



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7. Accelerated Permitting (optional): The Accelerated Permitting Program entitles you to install and operate qualifying sources of air pollution and abatement equipment **while your permit application is being processed**. To qualify for this program, you must certify that your project will meet all of the following criteria. Please acknowledge each item by checking each box.

- ☐ Uncontrolled emissions of any single pollutant are each less than 10 lbs/highest day, or the equipment has been pre-certified by the BAAQMD.
- ☐ Uncontrolled emissions of toxic compounds do not exceed the trigger levels identified in Table 2-5-1 (see Regulation 2, Rule 5).
- ☐ The source is not a diesel engine.
- ☐ The project is not subject to public notice requirements (the source is either more than 1000 ft. from the nearest school, or the source does not emit any toxic compound in Table 2-5-1 of BAAQMD Regulation 2, Rule 5).
- ☐ For replacement of abatement equipment, the new equipment must have an equal or greater overall abatement efficiency for all pollutants than the equipment being replaced.
- ☐ For alterations of existing sources, the requested change does not result in an increase in emissions for all pollutants.
- ☐ Payment of all applicable permit application fees (the minimum permit fee to install and operate each source). See Regulation 3 or contact the Engineering Division for help in determining your fees.

8. CEQA Please answer the following questions pertaining to CEQA (California Environmental Quality Act).

- A Has another public agency prepared, required preparation of, or issued a notice regarding preparation of a California Environmental Quality Act (CEQA) document (initial study, negative declaration, environmental impact report, or other CEQA document) that analyzes impacts of this project or another project of which it is a part or to which it is related? If no, go to section 8B. Describe the document or notice, preparer, and date of document or expected date of completion:

N/A

- B List and describe any other permits or agency approvals required for this project by city, regional, state or federal agencies

N/A

- C List and describe all other prior or current projects for which either of the following statements is true: (1) the project that is the subject of this application could not be undertaken without the project listed below, (2) the project listed below could not be undertaken without the project that is the subject of this application:

N/A

9. Trade Secret Information: Under the California Public Records Act, all information in your permit application will be considered a matter of public record and may be disclosed to the public, unless you have asked BAAQMD to treat certain items as trade secret as specified in Regulation 2, Rule 1, Section 402.7.

Does this application contain Trade Secret information? ☐ Yes ☒ No

- ☐ Each page containing trade secret information must be labeled “trade secret” with the trade secret information **clearly marked** and you must provide a “public copy” with the information **redacted**.
- ☐ For each item asserted to be trade secret, you must provide a statement which provides the basis for your claim.

10. Certification/Signature

I hereby certify that I am authorized to complete this form for the facility and that all information contained herein is true and correct.

I acknowledge that all documentation in this application submittal is a matter of public record unless otherwise indicated per Section 9 of this form.

Name	Title	
Signature	Date (mm/dd/yy)	Phone (xxx-xxx-xxxx)

An electronic version of this form and instructions can be found at www.baaqmd.gov.

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Name	Title	
TOM HUYNH	EAS Manager	
Signature	Date (mm/dd/yy)	Phone (xxx-xxx-xxxx)
	09/14/23	408-595-0947

An electronic version of this form and instructions can be found at www.baaqmd.gov.

DATA FORM T
Organic Liquid Evaporation
(tankage, loading and handling)

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

375 Beale Street, Suite 600... San Francisco, CA 94105

(415) 749-4990 FAX (415)-749-5030

1. Business Name: Apple Inc. Plant No: 22839
(if unknown, leave blank)
2. SIC No: 3674 Date of Initial Operation 7/15/17 (approx) Source No S- NEW
3. Name or Description Solvent Waste Tank
4. Code materials* in order of highest throughputs: 1) 157 2) 427 3) 4)
5. Total throughput (all materials), last 12 months: 170 thousand gal **or** thousand bbl
6. Typical % of total annual throughput: Dec-Feb 25 % Mar-May 25 % Jun-Aug 25 % Sep-Nov 25 %
☐ Check box if loading/handling facility; complete lines 7-11 and omit the remainder of this form. (Also complete one Form T for each storage tank)
7. • Usage type: ☐ Bulk plant (truck/rail car) ☐ Bulk plant (marine) ☐ Vehicle service station
☐ Aircraft/marine servicing Other: N/A
8. • How many nozzles/loading arms? N/A How many pumps? N/A
9. • Make and model of nozzles/loading arms: N/A
10. • Nozzle/arm loads tank by: ☐ splash fill ☐ submerged fill ☐ part splash, part submerged
11. • Upon loading, vapor space in tank(s) is: ☐ Vented directly to atmosphere
☐ Collected by nozzle/arm and sent to Abatement Device(s): A A
12. Annual Average: Storage vapor pressure 0.73 psia **or** tank temperature °F and RVP psia
13. Highest v.p. of all materials stored: 1.29 psia **or** high tank temperature °F and high RVP psia
14. Highest °API of all material stored: N/A ° Lowest initial B.P. of all materials stored: 180.5 °F
15. Tank Type: ☐ underground ☒ fixed roof ☐ internal floating roof ☐ floating roof
☐ pressure ☐ other:
16. Tank volume: 1.7 thousand gallons **or** thousand barrels
17. Tank Diameter: 5.89 ft height or length: 6.17 ft Check if applicable: ☒ heated ☒ insulated

Fixed Roof Tanks Only

18. Maximum fill rate: 600 gal/hr **or** bbl/hr
19. Average height of vapor space: 2.3 ft Highest head space reactivity 50 %
☒ Check box if emissions from this tank are controlled; complete lines 20 and 21.
20. • Emissions vent to what source(s) and/or abatement device(s)? S S A NEW A
21. • Do all gauging/sampling devices have gas-tight covers? ☒ yes ☐ no
22. Paint color: ☐ Aluminum ☒ White ☐ Light grey ☐ Medium grey ☐ Other
23. Paint Condition: ☒ good ☐ poor

Floating Roof Tanks Only

24. Shell Type: ☐ gunitied ☐ riveted ☐ welded ☐ other:
25. Seal Type: ☐ single ☐ double ☐ other: Condition: ☐ tight ☐ loose
26. Maximum withdrawn rate: gal/hr **or** bbl/hr
27. Do all gauging/sampling devices enter below liquid level and have gas-tight covers? ☐ yes ☐ no
28. Roof type: ☐ pan ☐ pontoon ☐ other: Is emergency roof drain at least 90% covered? ☐ yes ☐ no

Person completing this form Tom Huynh

Date 9/12/2023

***See Material Code Reference List.**

(revised 4/12/16)



**Data Form A
ABATEMENT DEVICE**

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

375 Beale Street, Suite 600 . . . San Francisco, CA 94105 . . . (415) 749-4990 . . . FAX (415) 749-5030

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for office use only

Abatement Device: Equipment/process whose primary purpose is to reduce the quantity of pollutant(s) emitted to the atmosphere.

1. Business Name: Apple Inc. Plant No: 22839
(If unknown, leave blank)
2. Name or Description Activated Carbon Canister Abatement Device No: A- NEW
3. Make, Model, and Rated Capacity Carbtrol G-1S Vapor Phase Canister 100 CFM
4. Abatement Device Code (See table*) 56 Date of Initial Operation 7/15/17 (approx)
5. With regard to air pollutant flow into this abatement device, what sources(s) and/or abatement device(s) are **immediately** upstream?
- S- NEW S- _____ S- _____ S- _____ S- _____
S- _____ A- _____ A- _____ A- _____ A- _____ A- _____
6. Typical gas stream temperature at inlet: _____ °F

If this form is being submitted as part of an application for an **Authority to Construct**, completion of the following table is mandatory. If not, and the Abatement Device is *already in operation*, completion of the table is requested but not required.

	Pollutant	Weight Percent Reduction (at typical operation)	Basis Codes (See Table**)
7.	Particulate		
8.	Organics	90%	7
9.	Nitrogen Oxides (as NO ₂)		
10.	Sulfur Dioxide		
11.	Carbon Monoxide		
12.	Other:		
13.	Other:		

14. ☐ Check box if this Abatement Device burns fuel; complete lines 1, 2 and 15-36 on Form C (using the Abatement Device No. above for the Source No.) and attach to this form.
15. With regard to air pollutant flow from this abatement device, what sources(s), abatement device(s) and/or emission point(s) are **immediately** downstream?
- S- _____ A- _____ A- _____ A- _____ P- _____ P- _____

Person completing this form: Tom Huynh

Date: 9/13/2023

(revised 5/18)

*ABATEMENT DEVICE CODES

Code	DEVICE
	ADSORBER (See Vapor Recovery)
	AFTERBURNER
1	CO Boiler
2	Catalytic
3	Direct Flame
4	Flare
5	Furnace-firebox
6	Other
	BAGHOUSE (See Dry Filter)
	CYCLONE (See Dry Inertial Collector / Scrubber)
	DUST CONTROL
68	Water Spray
	DRY FILTER
7	Absolute
8	Baghouse, Pulse Jet
9	Baghouse, Reverse Air
10	Baghouse, Reverse Jet
11	Baghouse, Shaking
12	Baghouse, Simple
13	Baghouse, Other
14	Envelope
15	Moving Belt
16	Other
	DRY INERTIAL COLLECTOR
17	Cyclone, Dynamic
18	Cyclone, Multiple (12 inches dia. or more)
19	Cyclone, Multiple (less than 12 inches dia.)
20	Cyclone, Simple
21	Settling Chamber, Baffled/Louvered
22	Settling Chamber, Simple
23	Other
	ELECTROSTATIC PRECIPITATOR
24	Single Stage
25	Single Stage, Wet
26	Two Stage
27	Two Stage, Wet
28	Other
	INCINERATOR (See Afterburner)
	INTERNAL COMBUSTION ENGINE CONTROL
69	Catalyzed Diesel Particulate Filter
70	Non-Cat. Diesel Part. Filter w/ Active Regeneration
71	Diesel Oxidation Catalyst
72	Oxidation Catalyst
	KNOCK-OUT POT (See Liquid Separator)
	LIQUID SEPARATOR
29	Knock-out Pot
30	Mist Eliminator, Horizontal Pad, Dry
31	Mist Eliminator, Panel, Dry
32	Mist Eliminator, Spray/Irrigated
33	Mist Eliminator, Vertical Tube, Dry
34	Mist Eliminator, Other
35	Other
	NO _x CONTROL
66	Selective Catalytic Reduction (SCR)
67	Non-Selective Catalytic Reduction (NSCR)
73	Selective Non-Catalytic Reduction (SNCR)

Code	DEVICE
	SCRUBBER
36	Baffle and Secondary Flow
37	Centrifugal
38	Cyclone, Irrigated
39	Fibrous Packed
40	Impingement Plate
41	Impingement and Entrainment
42	Mechanically Aided
43	Moving Bed
44	Packed Bed
45	Preformed Spray
46	Venturi
47	Other
	SETTLING CHAMBER (See Dry Inertial Collector)
	SULFUR DIOXIDE CONTROL
48	Absorption and Regeneration, for Sulfur Plant
49	Claus Solution Reaction, for Sulfur Plant
50	Dual Absorption, for H ₂ S ₀₄ Plant
51	Flue Gas Desulfurization, for Fossil Fuel Combustion
52	Reduction and Solution Regeneration, for Sulfur Plant
53	Reduction and Stretford Process, for Sulfur Plant
54	Sodium Sulfite-Bisulfite Scrubber, for H ₂ S ₀₄ Plant
55	Other
	VAPOR RECOVERY
56	Adsorption, Activated Carbon/Charcoal
57	Adsorption, Silica
58	Adsorption, Other
59	Balance
60	Compression/Condensation/Absorption
61	Compression/Refrigeration
62	Condenser, Water-Cooled
63	Condenser, Other
64	Other
	MISCELLANEOUS
74	Soil Vapor Extraction Abatement System
75	VOC Concentrator/Thermal Regenerator
76	Ethylene Oxide Catalytic Bed, Electric
65	Not classified above

**BASIS CODES

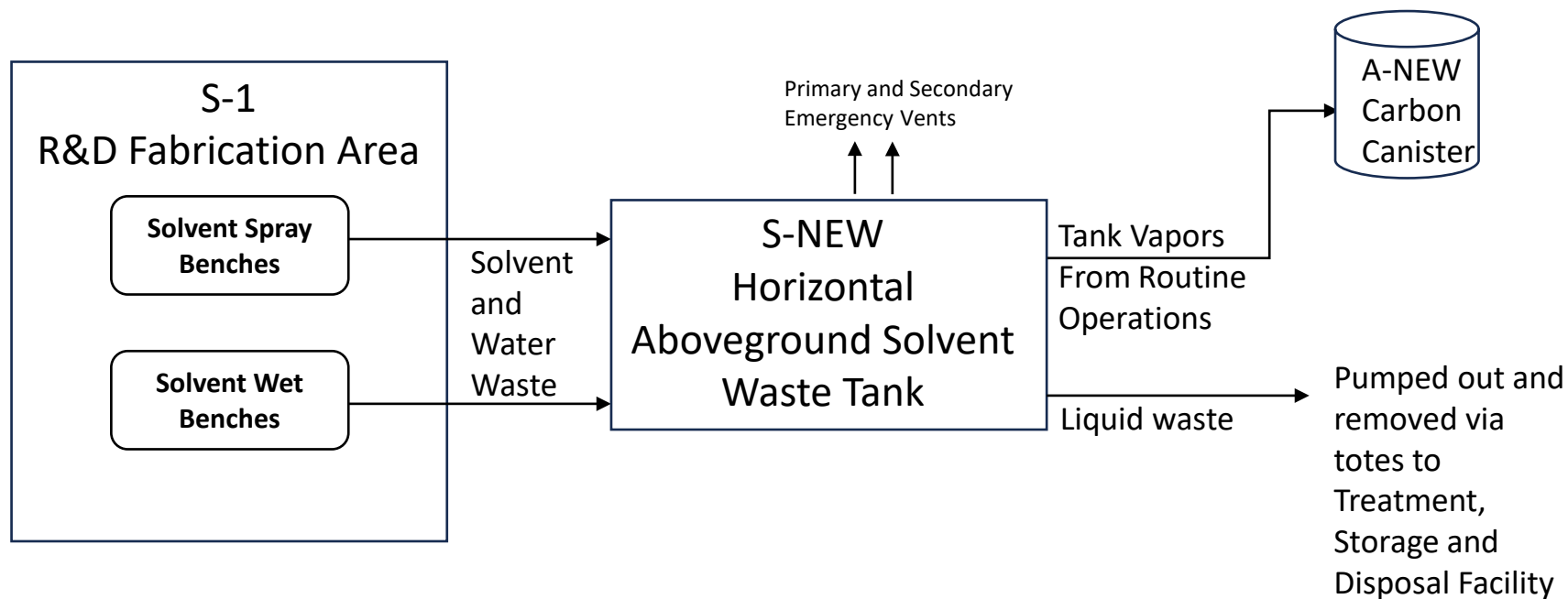
Code	Method
0	Not applicable for this pollutant
1	Source testing or other measurement by plant
2	Source testing or other measurement by BAAQMD
3	Specifications from vendor
4	Material balance by plant using engineering expertise and knowledge of process
5	Material balance by BAAQMD using engineering expertise and knowledge of process
6	Taken from AP-42 ("Compilation of Air Pollutant Emission Factors," EPA)
7	Taken from literature, other than AP-42
8	Guess

Appendix B: Facility Site Map and Process Flow Diagram

Figure 1 – Facility Map
3250 Scott Blvd, Santa Clara, CA 95054



Figure 2 - Basic Flow Diagram for Solvent Waste Tank
3250 Scott Blvd, Santa Clara, CA 95054



Appendix C: Emission Calculations

Table 1- Tank Properties

Parameter		Unit	Solvent Waste Tank
			S-NEW
Dimensions	Tank Type	--	Horizontal, Rectangular, Fixed Roof
	Shell Height	feet	6.17
	Tank Length	feet	8.42
	Shell Diameter	feet	5.89
	Working Volume	m ³	6.44
		gallons	1700
	Net Throughput	gallons/year	170,000
	Turnovers per Year	--	100
Breather Vent Settings	Insulated?	--	Yes
	Vacuum Setting	psig	-0.50
	Pressure Setting	psig	0.50
Nearest Major City		--	Santa Clara, CA
Average Bulk Liquid Temperature		F	86.0
Minimum Bulk Liquid Temperature		F	68.0
Maximum Bulk Liquid Temperature		F	104.0
Number of Tanks		--	1
Chemical Stored		--	Solvent Waste
Maximum Fill Rate (Based on Pump)		gal/hr	600

Note: Shell diameter is calculated as the diameter of a vertical cross-section of the horizontal tank

1 gal = 0.00378541 m³

Table 2 - Chemical Properties

Chemical Component ¹	CAS	Mol wt (lb/lb-mole)	Component wt fractions	Component Liquid mole fractions	Vapor pressure constants ^{2,3,4}			Vapor Pressure at Average Temperature (psi)	Vapor Pressure at Minimum Temperature (psi)	Vapor Pressure at Maximum Temperature (psi)
			0.00	0.00	A	B	C			
IPA	67-63-0	60.1	0.50	0.231	7.74	1357.43	197.34	1.13	0.60	2.01
Water	7732-18-5	18.02	0.50	0.769	7.95	1659.79	227.30	0.61	0.34	1.07

1. Solvent waste composition used in this analysis is conservative. Typical water content is ~84%. IPA was selected to represent solvent portion as it is a TAC and is the highest use solvent by volume at S-1.

2. IPA data is from NIST Webbook. Accessed at: <https://webbook.nist.gov/cgi/cbook.cgi?ID=C67630&Mask=4&Type=ANTOINE&Plot=on>

3. Water data is from NIST Webbook. Accessed at: <https://webbook.nist.gov/cgi/cbook.cgi?ID=C7732185&Mask=4&Type=ANTOINE&Plot=on>

4. NIST Webbook constants are expressed in units of bar and K for pressure and temperature respectively. The coefficients have been converted to appropriate units for Equation 1-26. A is converted by adding 2.8751; B remains the same; to convert C parameter from deg K to deg C, 273.15 is added. Pressure is then converted from mmHg to psia (760 mmHg = 14.7 psia) for use in other equations.

Ref: TANKS model FAQs. Accessed at <https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-chapter-7-tanks-software-frequent-questions#5>

Bulk temperature values for insulated horizontal tank	Value in deg F	Value in deg C
Average Bulk Liquid Temperature	86.00	30.00
Minimum Bulk Liquid Temperature	68.00	20.00
Maximum Bulk Liquid Temperature	104.00	40.00

True vapor pressure for mixture (psia)			
Tank Contents	TVP at Avg Temp	TVP at Min Temp	TVP at Max Temp
Solvent Waste	0.73	0.40	1.29

P_{VA} , total vapor pressure of the stored liquid, by Raoult's Law, is:

$$P_{VA} = \sum P_{X_i} \quad (1-23)$$

The true vapor pressure of organic liquids at the stored liquid temperature can also be estimated by Antoine's equation:

$$\log P_{VA} = A - \left(\frac{B}{T_{LA} + C} \right) \quad (1-26)$$

where:

\log = \log_{10}

A = constant in vapor pressure equation, dimensionless

B = constant in vapor pressure equation, °C

C = constant in vapor pressure equation, °C

T_{LA} = average daily liquid surface temperature, °C

P_{VA} = vapor pressure at average liquid surface temperature, mm Hg

Table 3 - Tank Emissions Calculations - Standing Losses

Symbol/Equation	Description	Units	S-NEW	Reference*	Notes
Breathing Losses:	Horizontal Tank, 1700 gallon capacity		0.00		
$L_s = 365 \cdot V_v \cdot W_v \cdot K_e \cdot K_s$	Standing storage loss, L_s	lb/yr	0.57	Equation 1-2	
T_{la}	daily average liquid surface temperature	F	86		Per Tank Parameters Table
$V_v = (\pi/4) \cdot D^2 \cdot H_v$	vapor space volume	ft ³	7	Equation 1-3	Calculation
$K_e = \Delta T_v / T_{la} + (\Delta P_v - \Delta P_b) / (P_a - P_v)$	vapor space expansion factor	dimensionless	0.058	Equation 1-5	Calculation
$K_s = 1 / (1 + 0.053 \cdot P_v \cdot H_v)$	vented vapor saturation factor	dimensionless	0.918	Equation 1-21	Calculation
$D_e = \sqrt{LD} / \pi/4$	effective tank diameter, D_e	ft	1.99	Equation 1-14	For horizontal tanks, effective tank diameter is calculated from tank D and L
$H_v = H_t / 2$	vapor space outage, H_v	ft	2.31	Equation 1-16	For horizontal tanks, vapor space outage is one-half of effective height
$H_t = (\pi/4) \cdot D$	effective tank height	ft	4.63	Equation 1-15	
$W_v = M_v \cdot P_v / (R \cdot T_a)$	stock vapor density, W_v	lb/ft ³	4.1E-03	Equation 1-22	
M_v	vapor molecular weight	lb/lb-mole	32.96		Equation 1-23
P_v	vapor pressure at daily average bulk liquid temperature	psia	0.73		Sum of partial pressures at average temperature
P_{vn}	vapor pressure at daily minimum bulk liquid temperature	psia	0.40		Sum of partial pressures at minimum temperature
P_{vx}	vapor pressure at daily maximum bulk liquid temperature	psia	1.29		Sum of partial pressures at max temperature
T_b	daily average liquid surface temperature	R	545.67	Equation 8-2	Average liquid bulk temperature ($T_{LA} = T_b$ for fully insulated tanks)
R	ideal gas constant	psia*ft ³ /(lb-mole*R)	10.73		
$\Delta T_v = T_{Bx} - T_{Bn}$	daily vapor temperature range	°R	36	Equation 8-1	Calculation
ΔP_v	daily vapor pressure range	psia	0.889	Equation 1-9	Calculation
ΔP_b	breather vent pressure setting	psia	1.00	Equation 1-10	Vent pressure setting, $P_{BP} = 0.5$ psia, Vacuum setting $P_{BV} = -0.5$ psia
Liquid Mass Fractions	IPA	dimensionless	0.50		Refer to the Chemical Properties Table
	Water	dimensionless	0.50		
Vapor Mass Fractions	IPA	dimensionless	0.65		Calculation (Vapor Mole Fraction * Component MW/ Vapor MW)
	Water	dimensionless	0.35		
MW_organic	IPA	lb/lb-mole	60.10		Refer to the Chemical Properties Table
	Water	lb/lb-mole	18.02		
X_component (Liquid Mole Fraction)	IPA	dimensionless	0.23		Refer to the Chemical Properties Table
	Water	dimensionless	0.77		
Y_component (Vapor Mole Fraction)	IPA	dimensionless	0.36		Calculation (partial vapor pressure/vapor pressure)
	Water	dimensionless	0.64		
partial vapor pressure at daily average liquid surface temperature	IPA	psia	0.26		Calculation (Liquid Mole Fraction * Vapor Pressure at Avg Temp)
	Water	psia	0.47		
partial vapor pressure at daily minimum liquid surface temperature	IPA	psia	0.14		Calculation (Liquid Mole Fraction * Vapor Pressure at Minimum Temp)
	Water	psia	0.26		
partial vapor pressure at daily maximum liquid surface temperature	IPA	psia	0.46		Calculation (Liquid Mole Fraction * Vapor Pressure at Max Temp)
	Water	psia	0.82		
T_{Bx}	typical maximum liquid bulk temperature	°R	563.67		
T_{Bn}	typical minimum liquid bulk temperature	°R	527.67		
P_a	daily average ambient pressure (Santa Clara, CA)	psia	14.82		Data from NSRDB: National Solar Radiation Database for 2015 - 2019
	constant	(psia-ft) ⁻¹	0.053		
Days per year	constant	year ⁻¹	365		

*Equations are from AP 42, Fifth Edition, Volume I Chapter 7: Liquid Storage Tanks, including reference to Section 7.1.3.8.4 (Heating Cycles in Fully Insulated Fixed Roof Tanks) where necessary

The tank is an insulated horizontal rectangular tank. It is assumed the tank receives heated solvent waste on occasion, leading to temperature variations. As the tank is designed for liquid storage at temperatures lower than 104 F, this value is used as the maximum bulk temperature. A temperature of 68 F is used as the typical minimum liquid bulk temperature.

Table 3 - Tank Emissions Calculations - Working Losses

Governing Equation (1-35)

$$Lw = V_Q * K_N * K_p * W_v * K_B$$

Unit Conversions	
1 barrel (bbl) =	42

Working Loss Input Parameters

Parameter	S-NEW	Unit	Description	Reference
W _v	4.12E-03	lb/ft ³	Vapor stock density	Equation 1-22
Q	170,000	gal/yr	Annual net throughput (tank capacity [gal] times annual turnover rate)	
D	2.0	ft	Tank diameter	
H _l	4.63	ft	Maximum liquid height	
H _L	0.00	ft	Minimum liquid height for horizontal tanks	
K _p	1	dimensionless	Working loss product factor	Equation 1-37
			for crude oils K _p = 0.75	
			for all other organic liquids, K _p = 1	

Tank Calculated Parameters*

Parameter	S-NEW	Unit	Description	Reference
Q	4048	bbl/yr	Annual net throughput (tank capacity [bbl] times annual turnover rate)	
V _Q	22723	ft ³	Tank maximum liquid volume	Equation 1-39
K _B	1	dimensionless	Vent setting correction factor, since Eq 1-40 is not met	
$K_N \left[\frac{P_{BP} + P_A}{P_I + P_A} \right] > 1.0$	0.19	dimensionless	Condition check for vent setting correction factor calculation	Equation 1-40
N	1586	dimensionless	Number of turnovers per year	Equation 1-36
K _N	0.19	dimensionless	Working loss turnover (saturation) factor, for turnovers >36, K _N = (180 + N)/6N	Equation 1-35
			for turnover ≤ 36, K _N = 1	

Working Losses Calculation

Number of Tanks	S-NEW	Unit
1	17.4	lb/yr

Total working losses

17.4

lb/yr

*The references in these calculations are to AP 42, Fifth Edition, Volume I Chapter 7: Liquid Storage Tanks

*<https://www3.epa.gov/ttn/chief/ap42/ch07/final/c07s00.pdf>

Table 5 - Emissions Summary

Total routine loss = Standing loss + working loss

$$L_T = L_S + L_W$$

Parameter	Value	Unit	Notes
Breathing loss (POC), L_S	0.57	lb/yr	
Working loss (POC), L_W	17.36	lb/yr	
Total routine loss (POC), L_T	17.93	lb/yr	
Carbon abatement efficiency	90%		Conservative assumption; See reference below
Controlled POC emissions	1.79	lb/yr	

Toxic Air Contaminant Emissions	Value	Unit	Notes
Annual IPA Emissions	0.90	lb/yr	50% IPA by weight
Chronic Trigger from Table 2-5-1	2.70E+05	lb/yr	
Exceeds trigger?	No		
Hourly IPA Emissions	3.16E-03	lb/hr	Calculated based annual throughput and maximum pump rate
Acute Trigger from Table 2-5-1	1.4	lb/hr	
Exceeds trigger?	No		

Reference for carbon abatement efficiency: EPA Cost Control Manual states that carbon adsorbers can achieve VOC remove efficiencies of 95 to 99%; therefore 90% is a conservative value. EPA Air Pollution Cost Control Manual, Section 3.1, Chapter 1 - Carbon Adsorbers. October 2018. Accessed at: https://www.epa.gov/sites/default/files/2018-10/documents/final_carbonadsorberschapter_7thedition.pdf

Table 6 - Estimated Fees

Category	Rate	Amount (USD)	Reference
Filing Fee	\$630	\$ 630.00	Reg 3
Initial Fee	0.185 cents per gallon; min \$204 and max \$27,858	\$ 314.50	Reg 3, Schedule C
Risk Assessment Fee	\$630 + 0.185 cents per gallon	\$ -	Not applicable per 3-329 as TAC emissions are below Reg 2-5 trigger levels
Permit to Operate Fee	0.093 cents per gallon; min \$147 and max \$13,928	\$ 158.10	Reg 3, Schedule C
Toxic Surcharge	10% of Permit to Operate Fee	\$ -	Not applicable as source does not emit TACs at a rate above Reg 2-5 chronic trigger levels
Total		\$ 1,102.60	

Note: Fees calculated based on Reg 3 effective 7/1/2023

Appendix D: Safety Data Sheet

SAFETY DATA SHEET

Creation Date 01-September-2009

Revision Date 18-January-2018

Revision Number 4

1. Identification

Product Name 2-Propanol

Cat No. : A426F-1GAL; A426P-4; A426S-4; A426S-20; A426S-200

CAS-No 67-63-0

Synonyms 2-Propanol; IPA; Isopropyl alcohol; Propan-2-ol; Isopropanol

Recommended Use Laboratory chemicals.

Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company

Importer/Distributor

Fisher Scientific
112 Colonnade Road,
Ottawa, ON K2E 7L6,
Canada
Tel: 1-800-234-7437

Manufacturer

Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number

CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification

WHMIS 2015 Classification Classified as hazardous under the Hazardous Products Regulations (SOR/2015-17)

Flammable liquids	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system, Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver.	

Label Elements

Signal Word

Danger

Hazard Statements

Highly flammable liquid and vapor
Causes serious eye irritation
May cause respiratory irritation
May cause drowsiness and dizziness
May cause damage to organs through prolonged or repeated exposure

**Precautionary Statements****Prevention**

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking

Keep container tightly closed

Ground/bond container and receiving equipment

Use explosion-proof electrical/ventilating/lighting/equipment

Use only non-sparking tools

Take precautionary measures against static discharges

Do not breathe dust/fumes/gas/mist/vapours/spray

Wash face, hands and any exposed skin thoroughly after handling

Use only outdoors or in a well-ventilated area

Wear protective gloves/protective clothing/eye protection/face protection

Response

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower

IF INHALED: Remove person to fresh air and keep comfortable for breathing

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

Call a POISON CENTER/ doctor if you feel unwell

In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish

Storage

Store in a well-ventilated place. Keep container tightly closed

Store locked up

Disposal

Dispose of contents/container to an approved waste disposal plant

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Isopropyl alcohol	67-63-0	>95

4. First-aid measures

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Get medical attention if symptoms occur.
Inhalation	Move to fresh air. Obtain medical attention. If not breathing, give artificial respiration.
Ingestion	Do not induce vomiting. Obtain medical attention.
Most important symptoms/effects	Breathing difficulties. May cause central nervous system depression: Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	CO ₂ , dry chemical, dry sand, alcohol-resistant foam. Cool closed containers exposed to fire with water spray.
Unsuitable Extinguishing Media	Water may be ineffective
Flash Point	12 °C / 53.6 °F
Method -	Abel Closed Cup (BS 2000 Part 170, IP 170, AS/NZS 2106)
Autoignition Temperature	425 °C / 797 °F
Explosion Limits	
Upper	12 vol %
Lower	2 vol %
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Flammable. Risk of ignition. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Containers may explode when heated.

Hazardous Combustion Products

Carbon monoxide (CO) Carbon dioxide (CO₂) peroxides

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health
2

Flammability
3

Instability
0

Physical hazards
N/A

6. Accidental release measures

Personal Precautions	Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges. Avoid contact with skin, eyes and clothing.
Environmental Precautions	Should not be released into the environment. See Section 12 for additional ecological information.

Methods for Containment and Clean Up	Prevent further leakage or spillage if safe to do so. Remove all sources of ignition. Soak up with inert absorbent material. Take precautionary measures against static discharges. Use spark-proof tools and explosion-proof equipment. Keep in suitable, closed containers for disposal.
---------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

7. Handling and storage

Handling	Wear personal protective equipment. Keep away from open flames, hot surfaces and sources of ignition. Use explosion-proof equipment. Use only non-sparking tools. Take precautionary measures against static discharges. Do not get in eyes, on skin, or on clothing. Do not breathe vapors or spray mist. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded.
Storage	Keep away from heat and sources of ignition. Flammables area. Keep container tightly closed in a dry and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	Alberta	British Columbia	Ontario TWAEV	Quebec	ACGIH TLV	OSHA PEL	NIOSH IDLH
Isopropyl alcohol	TWA: 200 ppm TWA: 492	TWA: 200 ppm STEL: 400 ppm	TWA: 200 ppm STEL: 400 ppm	TWA: 400 ppm TWA: 985	TWA: 200 ppm STEL: 400 ppm	(Vacated) TWA: 400 ppm	IDLH: 2000 ppm TWA: 400 ppm

	mg/m ³ STEL: 400 ppm STEL: 984 mg/m ³			mg/m ³ STEL: 500 ppm STEL: 1230 mg/m ³		(Vacated) TWA: 980 mg/m ³ (Vacated) STEL: 500 ppm (Vacated) STEL: 1225 mg/m ³ TWA: 400 ppm TWA: 980 mg/m ³	TWA: 980 mg/m ³ STEL: 500 ppm STEL: 1225 mg/m ³
--	----------------------------------------------------------------------	--	--	-----------------------------------------------------------------------	--	---------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures

Ensure that eyewash stations and safety showers are close to the workstation location. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure adequate ventilation, especially in confined areas.

Wherever possible, engineering control measures such as the isolation or enclosure of the process, the introduction of process or equipment changes to minimise release or contact, and the use of properly designed ventilation systems, should be adopted to control hazardous materials at source

Personal protective equipment**Eye Protection**

Goggles

Hand Protection

Wear appropriate protective gloves and clothing to prevent skin exposure.

Glove material	Breakthrough time	Glove thickness	Glove comments
Butyl rubber	> 480 minutes	0.5 mm	Permeation rate < 0.9 µg/cm ² /min
Nitrile rubber	> 360 - 480 minutes	0.35 - 0.55 mm	As tested under EN374-3 Determination of Resistance to Permeation by Chemicals

Inspect gloves before use. observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. (Refer to manufacturer/supplier for information) gloves are suitable for the task: Chemical compatibility, Dexterity, Operational conditions, User susceptibility, e.g. sensitisation effects, also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion. gloves with care avoiding skin contamination.

Respiratory Protection

When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained properly

Recommended Filter type: Organic gases and vapours filter Type A Brown conforming to EN14387

When RPE is used a face piece Fit Test should be conducted

Environmental exposure controls

No information available.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice. Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing before re-use. Wash hands before breaks and at the end of workday.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	Alcohol-like
Odor Threshold	No information available
pH	7 1% aq. sol
Melting Point/Range	-89.5 °C / -129.1 °F

Boiling Point/Range	81 - 83 °C / 177.8 - 181.4 °F @ 760 mmHg
Flash Point	12 °C / 53.6 °F
Method -	Abel Closed Cup (BS 2000 Part 170, IP 170, AS/NZS 2106)
Evaporation Rate	1.7
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	12 vol %
Lower	2 vol %
Vapor Pressure	43 mmHg @ 20 °C
Vapor Density	2.1 @ 20 °C / 68 °F
Specific Gravity	0.785
Solubility	Miscible with water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	425 °C / 797 °F
Decomposition Temperature	No information available
Viscosity	2.27 mPa.s at 20 °C
Molecular Formula	C3 H8 O
Molecular Weight	60.1
VOC Content(%)	100% (Organic Carbon (by mass) = 59.9 %) (EC/1999/13)
Refractive index	1.377 at 20 °C / 68 °F (ASTM D-1218)
Surface tension	22.7 mN/m at 20 °C / 68 °F
Coefficient of expansion	0.0009 / °C
Dielectric constant	18.6 at 20 °C / 68 °F
Heat of vapourisation	665 J/g
Specific heat capacity	3 kJ/kg °C at 20 °C / 68 °F
Thermal conductivity	0.137 W/m °C at 20 °C / 68 °F

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Heat, flames and sparks. Keep away from open flames, hot surfaces and sources of ignition.
Incompatible Materials	Strong oxidizing agents, Acids, Halogens, Acid anhydrides
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO ₂), peroxides
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Isopropyl alcohol	5840 mg/kg (Rat)	13900 mg/kg (Rat) 12870 mg/kg (Rabbit)	72.6 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation	Irritating to eyes and skin
Sensitization	No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Isopropyl alcohol	67-63-0	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system Central nervous system (CNS)

STOT - repeated exposure Kidney Liver

Aspiration hazard No information available

Symptoms / effects, both acute and delayed May cause central nervous system depression: Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

. Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Isopropyl alcohol	EC50: > 1000 mg/L, 72h (Desmodesmus subspicatus) EC50: > 1000 mg/L, 96h (Desmodesmus subspicatus)	LC50: > 1400000 µg/L, 96h (Lepomis macrochirus) LC50: = 9640 mg/L, 96h flow-through (Pimephales promelas) LC50: = 11130 mg/L, 96h static (Pimephales promelas)	= 35390 mg/L EC50 Photobacterium phosphoreum 5 min	13299 mg/L EC50 = 48 h 9714 mg/L EC50 = 24 h

Persistence and Degradability Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

Component	log Pow
Isopropyl alcohol	0.05

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN1219
Proper Shipping Name Isopropanol
Hazard Class 3
Packing Group II

TDG

UN-No UN1219
 Proper Shipping Name ISOPROPANOL
 Hazard Class 3
 Packing Group II

IATA

UN-No UN1219
 Proper Shipping Name Isopropanol
 Hazard Class 3
 Packing Group II

IMDG/IMO

UN-No UN1219
 Proper Shipping Name Isopropanol (Isopropyl alcohol)
 Hazard Class 3
 Packing Group II

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	DSL	NDSL	TSCA	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Isopropyl alcohol	X	-	X	200-661-7	-		X	X	X	X	X

Canada

SDS in compliance with provisions of information as set out in Canadian Standard - Part 4, Schedule 1 and 2 of the Hazardous Products Regulations (HPR) and meets the requirements of the HPR (Paragraph 13(1)(a) of the Hazardous Products Act (HPA)).

Component	Canada - National Pollutant Release Inventory (NPRI)	Canadian Environmental Protection Agency (CEPA) - List of Toxic Substances	Canada's Chemicals Management Plan (CEPA)
Isopropyl alcohol	Part 1, Group A Substance Part 5, Individual Substances		

16. Other information

Prepared By Regulatory Affairs
 Thermo Fisher Scientific
 Email: EMSDS.RA@thermofisher.com

Creation Date 01-September-2009

Revision Date 18-January-2018

Print Date 18-January-2018

Revision Summary This document has been updated to comply with the requirements of WHMIS 2015 to align with the Globally Harmonised System (GHS) for the Classification and Labelling of Chemicals.

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text


End of SDS

Appendix E: Equipment Specifications

ITEM NO.: FG1700R



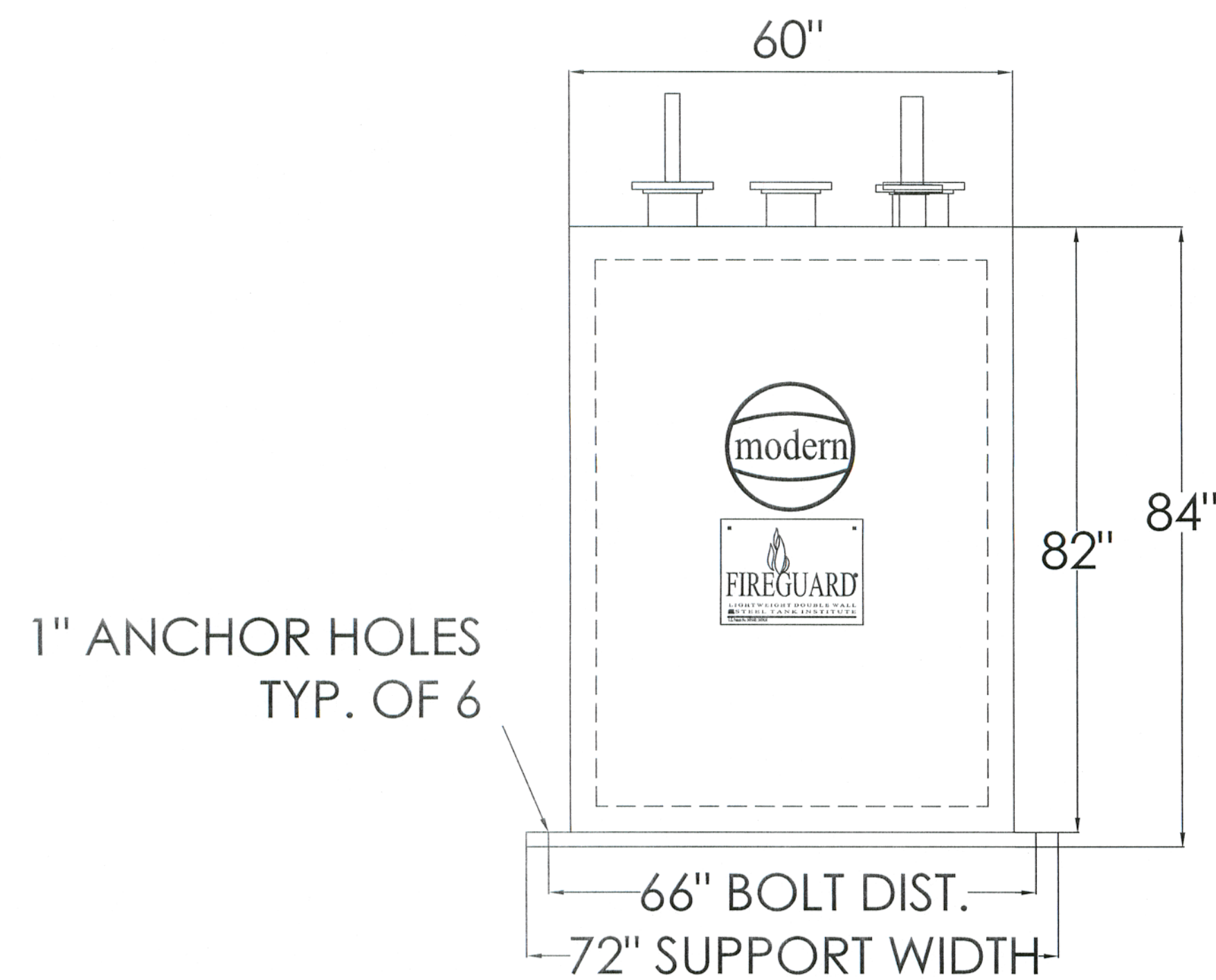
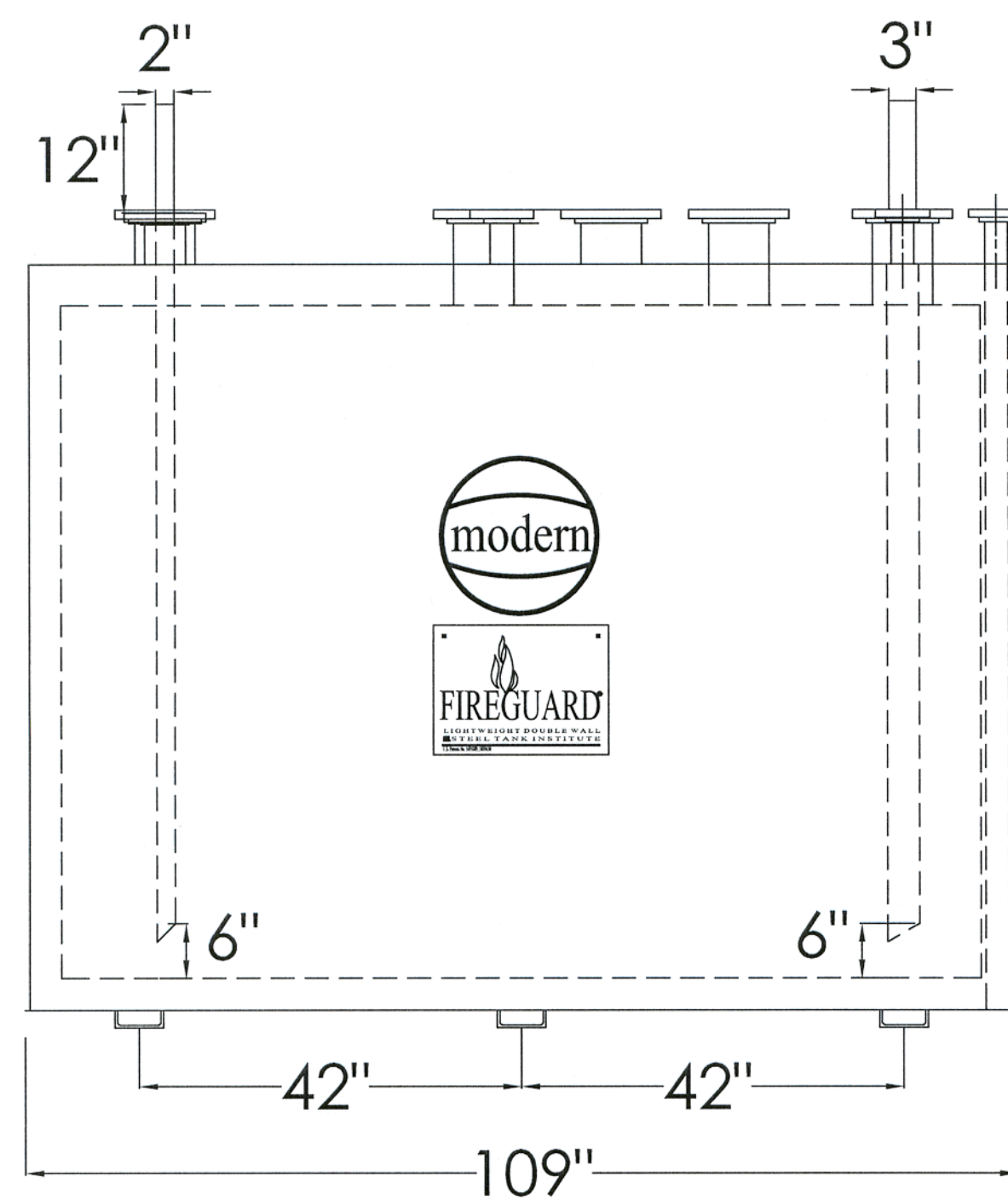
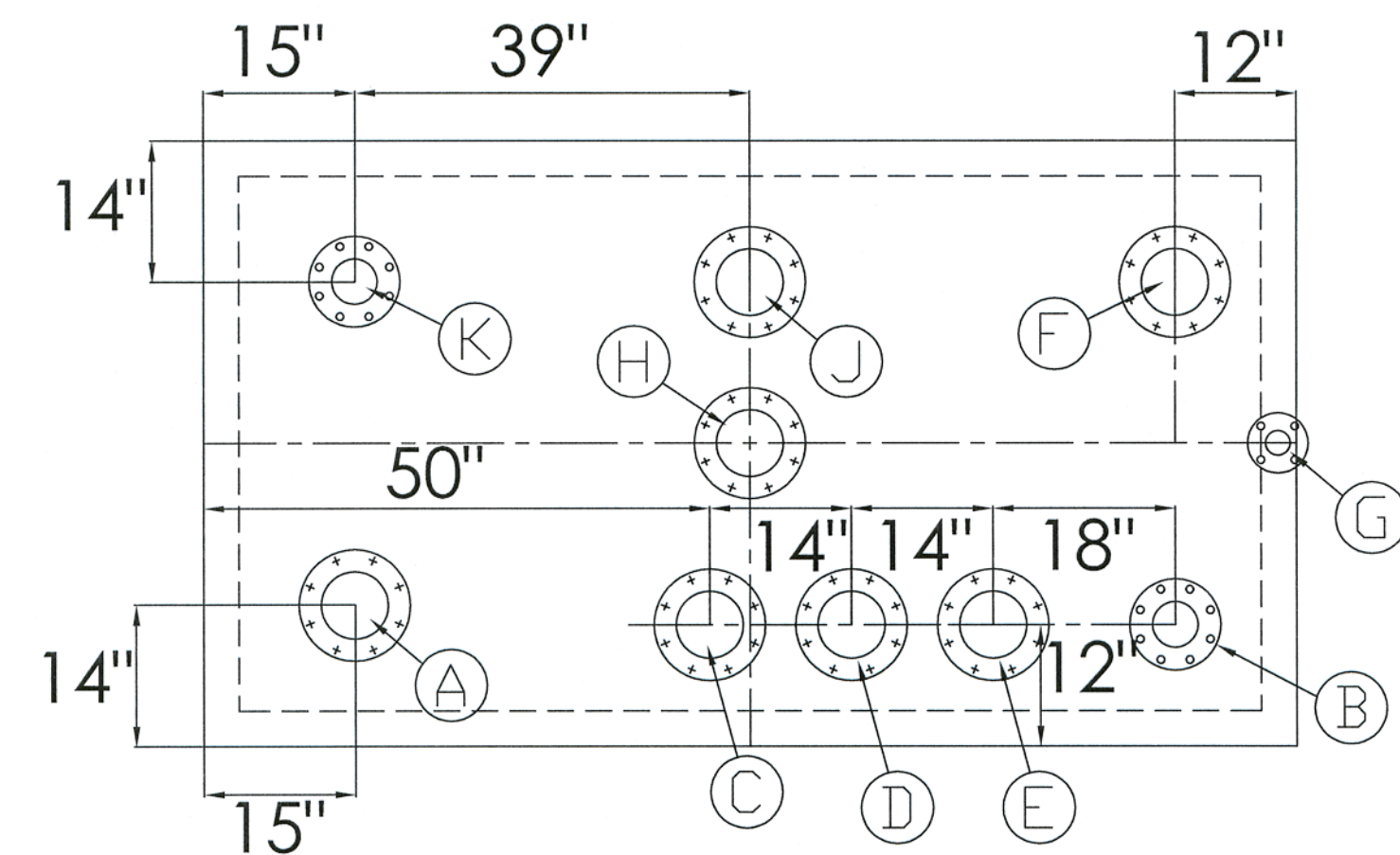
INTEGRATED ENGINEERING SERVICES
1,700 GALLON UL 2085 FIREGUARD TANK

DWN. BY	JC	DATE 8/19/16	SCALE: NONE
CHK. BY		JOB NO.	DWG. NO. 13826 
APR. BY		P.O. NO.	SHT. NO. 1 OF 1

NOTE: PRIMARY TANK AND OPENINGS
OF 316L STAINLESS STEEL

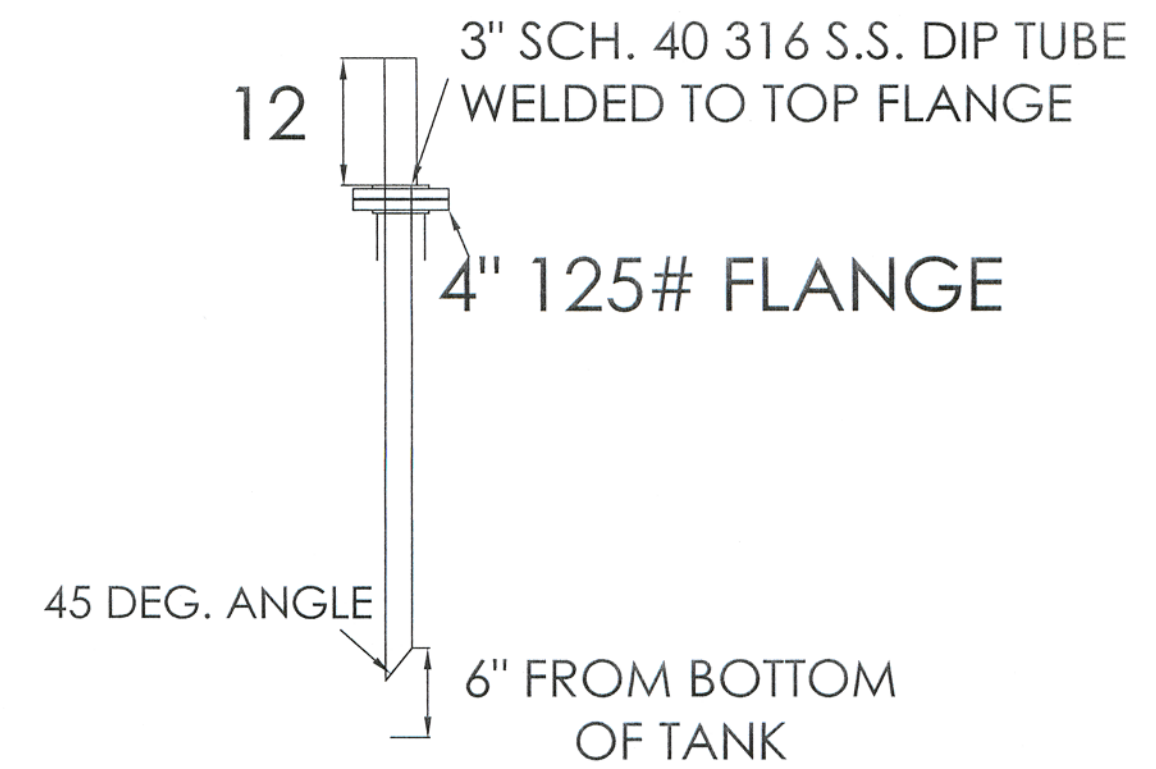
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B	1	4"	RFS□	PUMP
C	1	6"	RFS□	VENT
D	1	6"	FFS□	SEC. E-VENT
E	1	6"	FFS□	PRI. E-VENT
F	1	6"	RFS□	SPARE
G	1	2"	RFS□	MONITOR
H	1	6"	RFS□	SPARE
J	1	6"	RFS□	SPARE
K	1	4"	RFS□	WASTE INLET

MARK	REQ'D	SIZE	TYPE	REMARKS
— SCHEDULE OF OPENINGS —				

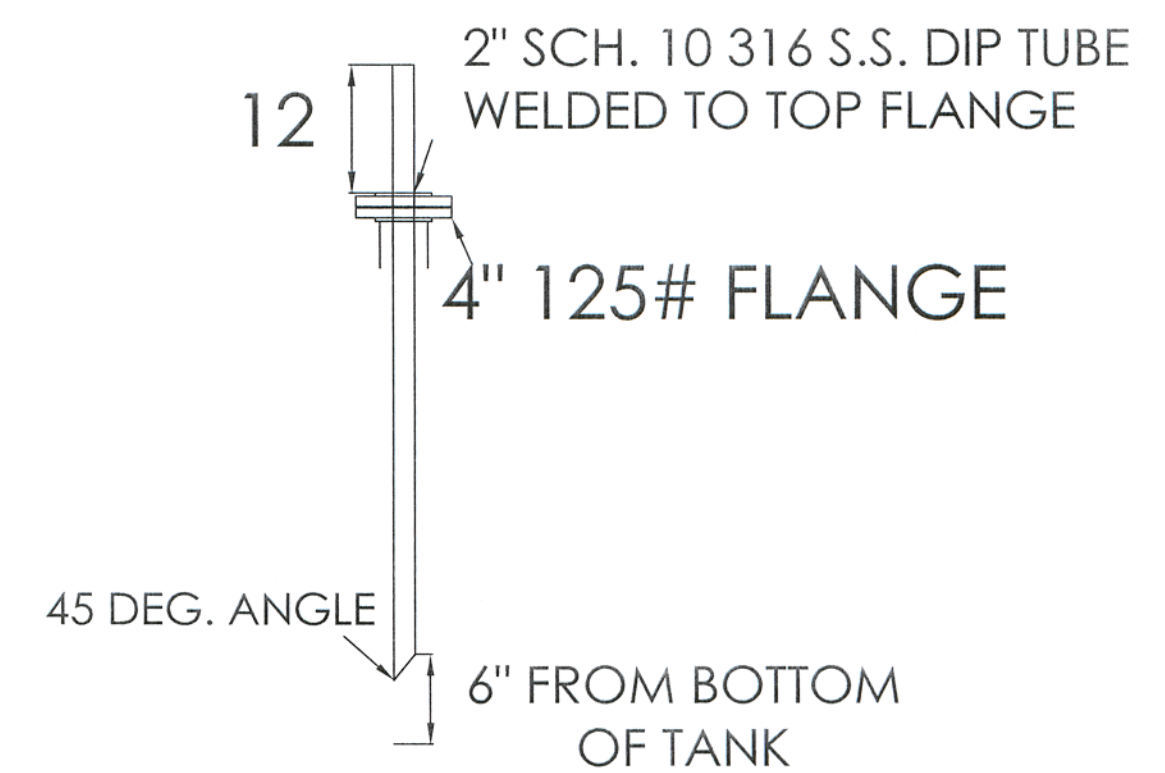


1) INNER & OUTER TANKS SHALL BE CONSTRUCTED PER UL-142. TANKS SHALL BEAR UL 2085 LABEL FOR "INSULATED SECONDARY CONTAINMENT ABOVEGROUND TANK FOR FLAMMABLE LIQUIDS".

ESTIMATED EMPTY TANK WEIGHT: 9,200#



FITTING "B"
DETAIL



FITTING "K"

DETAIL

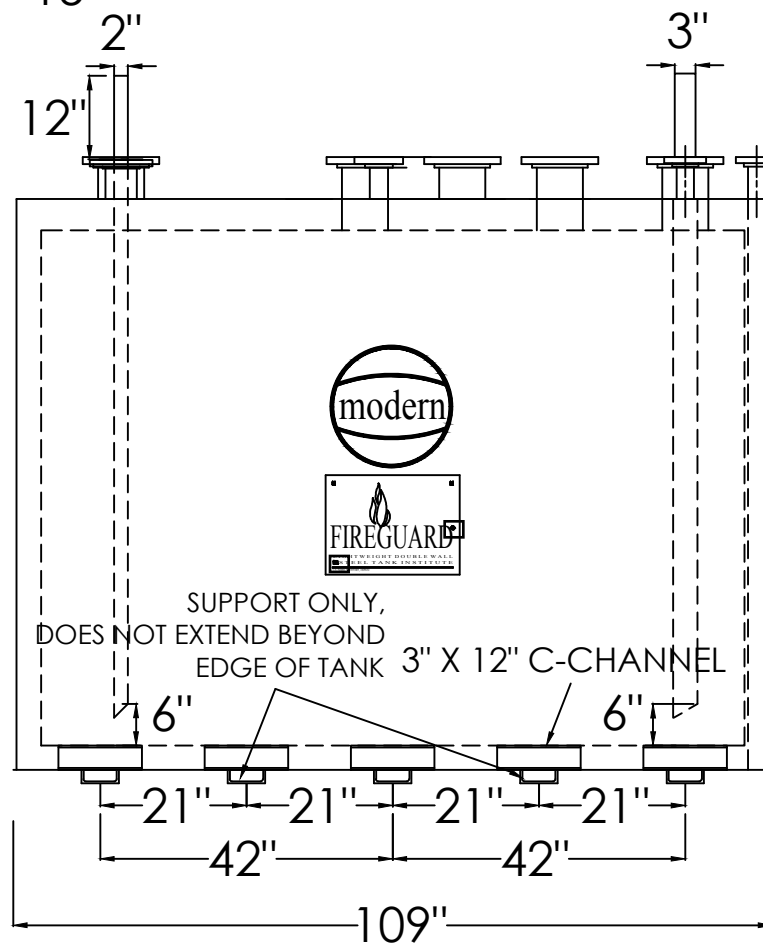
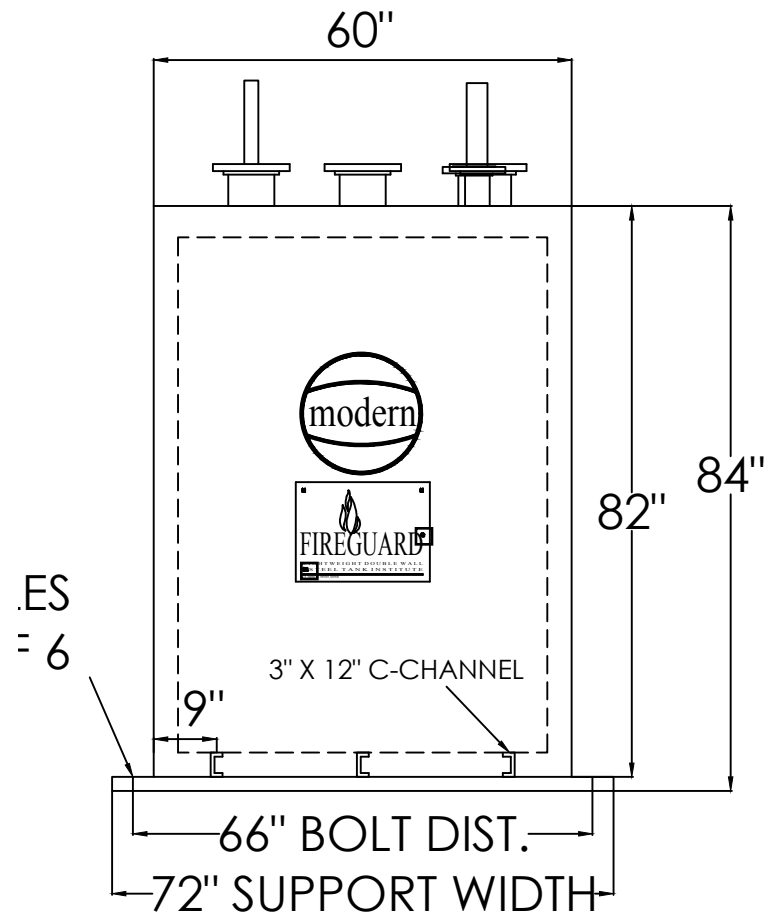
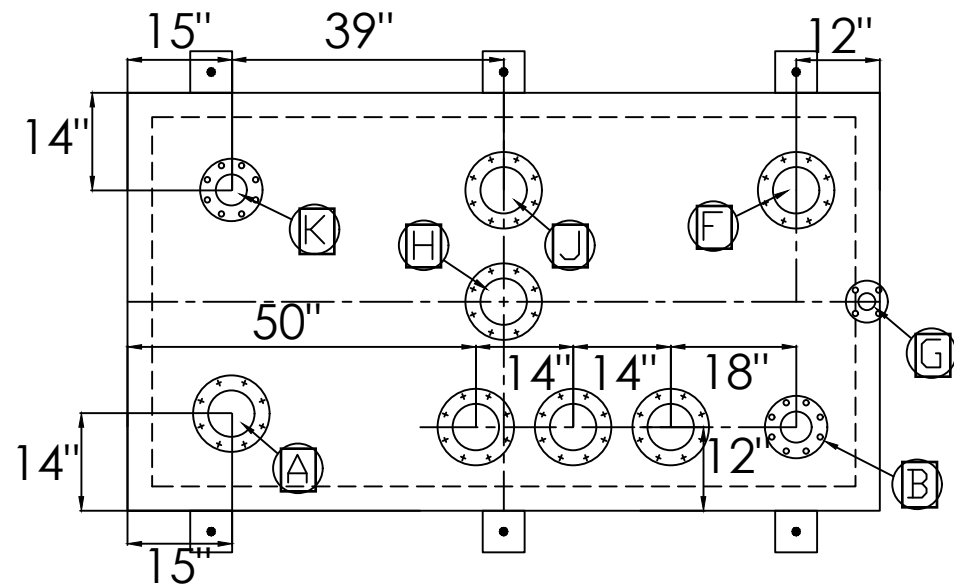
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SUBMITTAL # <u>15046 UL 2025 FIREGUARD THN K</u>	
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<input type="checkbox"/> REJECTED	<input type="checkbox"/> REVISE AND RESUBMIT
<input type="checkbox"/> SUBMIT SPECIFIC ITEM	
<p>Review is only for general conformance with the design concept of the project and the general compliance with the information given in the contract documents and shall not in any way relieve the Contractor from his responsibility for the design and construction of the project and the performance of the work. The Contractor is responsible for dimensions, weights, and quantities and is responsible for the quality and quantity of the materials. The Contractor is responsible for the selection and use of materials and equipment, and for the performance of the work and the quality and quantity of the materials and equipment.</p>	
<p align="center">INTEGRATED ENGINEERING SERVICES</p>	
By <u>[Signature]</u>	Date <u>10/12/16</u>

LEAN OF DEBRIS

POLYURETHANE

TANK AND OPENINGS

IS STEEL



PRODUCT DESCRIPTION

**ACTIVATED CARBON CANISTER
VAPOR PHASE FOR VOC REMOVAL**

Model:	G-1S	G-2S	G-3S
Design Flow (CFM):	100	300	500
Design Features:			
Pressure Drop at Design Flow (in. w.c.):	3.5	4.25	5.0
Carbon Weight (lbs.):	200	170	140
Carbon	Vapor phase activated carbon, high activity.		
Canister:	24"Ø X 34" high epoxy lined carbon steel drum. PVC internal piping. Acceptable for transport of hazardous spent carbon.		
Maximum Operating Pressure	10 psi	10 psi	10 psi
Connections:	Inlet and outlet couplings located in lid. 3/4" side bung drain.		
Inlet & Outlet Size:	2" FPT	4" FPT	4" FPT
Shipping Weight (lbs.):	250	220	190
Availability:	2 days		
Drawing Number:	S-1113	S-1114	S-1115